TOOTHBRUSH HAVING MULTIPLE SELECTABLE BRUSHING SURFACES

CROSS REFERENCE TO RELATED APPLICATIONS

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BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates generally to an adjustable toothbrush, and more particularly, to an adjustable toothbrush that mechanically adjust to three different configurations to correspond to the teeth being brushed so as to provide a user with improved teeth cleaning coverage

2. Description of the Background Art

The upper and lower sets of teeth are shaped like little horseshoes having generally three main and distinctive shapes. The frontal teeth are radial in shape, the back teeth have opposite inverted radial shapes and the tops and sides are considerably straight. Most toothbrushes are designed with a straight or slightly inverted radial brushing surface, which do not conform to all three geometries, resulting in inadequate

cleaning. Therefore, several toothbrushes of varying shapes should be used to provide complete cleaning. However, using two, three or more toothbrushes to properly clean teeth can be expensive, cumbersome, messy and impractical. An all in one toothbrush that changes to conform to various shaped areas would offer a much more efficient cleaning as well as a satisfying brushing experience. If an adjustable toothbrush existed that conformed to the various geometry of teeth, it would be well received. The instant invention addresses this unfulfilled need in the prior art by providing a toothbrush that offers a plurality of adjustable surfaces for facilitating improved contact with the teeth and hence enhanced cleaning, as described herein.

BRIEF SUMMARY OF THE INVENTION

In light of the foregoing, it is an object of the present invention to provide a toothbrush that adapts to the various geometries of teeth to improve contact with the teeth.

It is another object of the instant invention to provide a toothbrush that has an adjustable brushing surfacing for conforming to the various contours of teeth.

It is also an object of the instant invention to provide a toothbrush having an adjustable surface that comes in contact with the various gaps and crevices typically missed by conventional toothbrushes.

It is an additional object of the instant invention to provide an adjustable toothbrush that is convenient and easy to use.

It is an additional object of the instant invention to provide an adjustable toothbrush that is cost-effective with respect to manufacturing.

It is a further object of the instant invention to provide an adjustable toothbrush that improves the dental hygiene of the average person.

It is yet another object of the instant invention to provide an adjustable toothbrush that provides a brush surface that may be adjusted to provide a plurality of different contours.

In light of these and other objects, the instant invention comprises a toothbrush having a surface that is adjustable to accommodate the concave, convex and straight geometries of the average set of teeth. The adjustable toothbrush of the instant invention is designed to help the bristles come in direct contact with the teeth regardless of its geometry and so long as the proper adjustment is made, to facilitate more efficient dental hygiene. The adjustable toothbrush preferably has three selectable surface variations or configurations to correspond with the three common surface geometries of teeth. The three configurations comprise a flat surface, an inverted/concave surface, and a radial/convex surface. The adjustable toothbrush generally comprises a brushing surface defined by a plurality of bristles, a bristle mount, at least one adjustment key, hollow brush casing and adjustment mechanism. The bristles are secured to the mount and the mount engages the adjustment mechanism. The bristle mount is flexible to accommodate manipulation of its shape by the adjustment mechanism. Depending on the setting, the adjustment mechanism raises the mount to create the radial version, lowers the mount to create the inverted version or leaves the mount stationary for the flat version. The toothbrush may also be designed to provide a plurality of alternative brush contours. The brush configurations are adjusted by a rotatable or slidable tactile control, referenced herein as a drive mechanism. The adjustable toothbrush is preferably manufactured with plastic and could offer soft, medium and hard flexible brushing bristles.

The instant invention mechanically changes brushing surfaces to provide maximum contact with teeth for more efficient cleaning. The flexible bristle mount allows the user to manipulate the surface configuration of the toothbrush bristles to provide a straight configuration for flat, accessible tooth surfaces, an inverted configuration for the back of the teeth and a radial configuration for the frontal teeth surfaces. In an alternative embodiment, the instant invention may a plurality of other configurations as shown herein.

In accordance with these and other objects, which will become apparent hereinafter, the instant invention will now be described with particular reference to the accompanying drawings.

BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWINGS

Fig. 1 provides a perspective exploded view in Fig. 1A and perspective views in Figs. 1B-1D of a first embodiment of the adjustable toothbrush in accordance with the instant invention.

Fig. 2 provides perspective views in Figs. 2A-2E of a second embodiment of the adjustable toothbrush in accordance with the instant invention.

Fig. 3 provides elevational views in Figs. 3A-3C of a third embodiment of the rotating cam version of the adjustable toothbrush in accordance with the instant invention.

Fig. 4 provides elevational views in Figs. 4A-4C of a fourth or push/pull embodiment of the adjustable toothbrush.

Fig. 5 provides elevational views in Figs. 5A-5C of a fifth or thumb slide embodiment of the instant invention.

Fig. 6 provides side and plan views of the preferred embodiment of the flexible mount in accordance with the instant invention.

Fig. 7 provides elevational views of an assembled 12-segment toothbrush with form keys in accordance with the instant invention.

Fig. 8 provides elevational views of the components of the 12-segment toothbrush in accordance with the instant invention.

Fig. 9 provides elevational views of the brush surface design variations of the instant invention utilizing bristle holders extending lengthwise with respect to the brush holder.

Fig. 10 provides elevational views of the bristle configurations for the 12-segment brush utilizing a variety of different key configurations in accordance with the instant invention.

Fig. 11 provides elevational views of the 10-segment toothbrush with formed wire twist guide in accordance with the instant invention.

Fig. 12 provides elevational views of the bristle configurations that may be derived with a formed wire guided bristle mount in accordance with the instant invention.

Fig. 13 provides elevational views of the self-adjusting bristle mount utilizing magnets in accordance with the instant invention.

Fig. 14 provides elevational views of the electronically controlled toothbrush and bristle mount in accordance with the instant invention.

DETAILED DESCRIPTION OF THE INVENTION

With reference to the drawings, Figs. 1 to 14 depict the preferred embodiments of the instant invention which is generally referenced as an adjustable toothbrush and, or by

numeric character 10. The adjustable toothbrush 10 is designed so that more bristles, in comparison to toothbrushes having a static or virtually static bristle configuration, come in direct contact with the teeth so long as the proper adjustment is made. With reference to Figs. 1A to 14, the adjustable toothbrush 10 comprises a handle 20 having a proximal/grasping end and a distal end defining or having a brush/bristle system casing 22, a brush system 11 comprising a bristle mount 14 and plurality of bristles 16 mounted to and/or projecting outward from the bristle mount 14 and an adjustment system 17 (17a-17c) that adjust the elevation of the bristle mount 14, at least one segment of the bristle mount 14 and/or at least one bristle segment. The handle 20 may also comprise a grip 34 for enhancing control.

The bristles 16 and mount 14 are secured in the hollow brush casing 22, as shown in Fig. 1, by securing the mount 14 to the adjustment mechanism by way of at least one and preferably two engagement tabs 15. The adjustable toothbrush 10 preferably has three selectable surface variations or configurations, as shown in Figs. 1 and 2, to correspond with the three surfaces of the teeth. The three configurations comprise a flat surface 12, an inverted surface 12, and a radial surface 12, as shown in Figs. 1B, 1C and 1D, respectively. The bristles 16 are mounted to the bristle mount 14 as shown in Figs. 6 and 8. With reference to Figs. 6 and 8, the bristle mount 14 comprises at least one base 14a having a locking groove 14b, and a plurality of bristle holder segments 14c comprising plastic molded supports 14d having a plurality of bristle sleeves 14e for securely receiving the bristles 16. As a result of this construction, the bristle mount 14 is flexible and may be raised proximal the center to create the radial version, as shown Fig. 1D, lowered to create the inverted version, as shown in Fig. 1C, or left stationary for the

flat version, as shown in Fig. 1A. The three configurations are selected by engaging the bristle mount base 14a with an adjustment mechanism 17a, 17b or 17c. The locking groove 14b locks the bristle mount 14 in a set position. The adjustable toothbrush 10 is preferably manufactured with plastic and could offer soft, medium and hard flexible brushing bristles 16.

The adjustment mechanism resides in the handle 20 between the grip 34 and head of the toothbrush 10 and has three embodiments, as shown in Figs. 3 to 5. The adjustment mechanism generally comprises a cam or lever connected to or engageable with the flexible bristle mount 14 in a position, such as proximal the center, that deforms the mount 14 into a straight, radial or inverted position, as shown in Figs. 3-5. Affixing it proximal the center of the mount base 14a allows the use of a double cam on both the proximal and distal ends of the mount 14 to obtain the various configurations. The cam or lever is attached to the drive mechanism 32 by way of the connecting rod 28 to manipulate the mount 14 by pushing and pulling and, or rotating the connecting rod 28. The use of an additional guide mount may be incorporated above the flexible mount 14 to keep the bristles 16 straight.

With reference to Figs. 1-5, 7 and 9-14, the adjustment mechanism/system 17 embodiments (17a-17c) are shown. Referring to Figs.1, 4 and 5, the first adjustment mechanism 17a comprises at least one bristle mount engagement tab 15, a mount ramp or inclined lever 26 that engages the bristle mount base 14a and/or tab 15 in a manner that adjusts its elevation when adjusted, a guide groove 29 extending along at least one side surface of the ramp 26 for guiding at least one pin projecting from the tab 15 to facilitate changes in elevation of the mount 14 and a connecting rod 28 attached to, joined to, in

engagement with and, or otherwise in mechanical or magnetic communication with a drive mechanism 32. The drive mechanism 32 may comprise a rotatable handle, push/pull handle 32a as shown in Fig. 4 or thumb slide 32b as shown in Fig. 5. The first variation 17a preferably uses a three-position push/pull handle and lever drive mechanism, as shown in Fig. 4. When the handle is pushed, the connecting rod 28 urges the center of the flexible mount 14 upward and when the handle is pulled the connecting rod 28 urges the center of the flexible mount 14 downward.

Referring to Figs. 2 and 7, the second adjustment mechanism 17b comprises at least one adjustment key 18 or 19 and preferably a first adjustment key 18, a second adjustment key, a connecting rod 28 and one of the drive mechanisms 32. The first adjustment key 18 is substantially concave and the second adjustment key 19 are connected or mechanically engaged with the connecting rod 28 and the connecting rod 28 is driven by the drive mechanism 32. The keys 18 and 19 raise and lower the bristle mount 14, respectively, depending on which way and how far the drive mechanism 32 is actuated.

With reference to Fig. 3, a third variation comprises a three-position rotating cam. The third adjustment mechanism 17c comprises at least one bristle mount engagement tab 15, rotating cam 40, connecting rod 28 and a rotating drive mechanisms 32. The tab 15 engages or is connected to the bristle mount base 14a at one end and to the connecting rod 28 at another end. When the drive mechanism 32 is rotated it imparts rotational movement of the cam 40 causing the mid-section of the bristle mount 14 to be raised or lowered. The third variation comprises a thumb slide version, comprising a thumb control switch 30 in the side of the handle for pushing and pulling the connecting rod.

The toothbrush 10 may incorporate a flexible unitary or segmented bristle mount 14 connected to the adjustment mechanism 17 in a manner that deforms the shape of the mount 14 into the desired configuration. Each of the three mechanism variations would allow the brush configuration to be changed by manipulating the flexible brush mount 14. The use of an additional guide mount could be incorporated above the flexible mount in order to keep the bristles straight. The instant invention 10 may also comprise

With reference to Figs. 9-14, alternative adjustment systems and, or adjustment key configurations may be incorporated with the adjustment system 17 to achieve a variety of other brush surface configurations, as shown. With reference to Fig. 9, the bristle segments 14c may comprise various shapes to vary brush surface configurations. Referring to Figs. 9 and 10, the adjustment system 17 may comprise a plurality of different adjustment key configurations 21a-21h to provide alternative brush surface 12 configurations. With reference to Fig. 11, the adjustment system 17 may comprise a formed wire twist guide 31. The twist guide 31 comprises a preformed wire having a raised or contoured shape that extends from, is connected to or otherwise engages the connecting rod 28 to facilitate rotation when the rotating drive mechanism 32 is turned. The twist guide 31 may have an elongated end that replaces and provides the same function as the connecting rod 28.

The adjustable toothbrush 10 is adjusted by manipulating the push/pull mechanism, thumb slide or rotating cam drive mechanism 32, depending on the embodiment employed. By doing so, the user adjusts the brush formation to be flat, inverted or raised according to the teeth being brushed. Each of these surfaces corresponds with the three major surfaces of the teeth. The inverted radial surface may

be used on the frontal surfaces of the teeth, the inverted brushing surface may used on the inside of the teeth and the flat brushing surface may be used on the flat areas of the teeth.

With respect to the instant invention 10, one method for changing the brushing surface 12, of the toothbrush 10, is using a unitary flexible bristle mount 14. Another method of achieving the brushing surface configurations shown comprises use of a segmented bristle mount 14. The instant invention 10 may incorporate different key configurations 21a-21h to create a wide variety of designs that include different geometrical surface configurations besides radial bends, as shown in Figs. 9-10. The bristle mount 14 can be divided into any number of independently moving sections 14c with unique shapes that offer a wide variety changeable brushing surfaces, as shown in Fig. 9. For instance, a straight brush could be transformed, temporarily, into a reach style brush, by mechanically extending the distal bristles, for cleaning those hard to reach back teeth and then back to a straight brush to continue normal cleaning, or, from straight, to radial, then inverted radial and back. Numerous combinations of two, three or more toothbrushes can be developed into one. Alternatively, the toothbrush 10 may comprise an electronic version wherein the bristle mount segments 14c are caused to alternate left and right, with adjacent segments 14c moving in opposite directions, as shown in Fig. 14. Figure 14 shows the electric toothbrush 10 that produces opposing brush strokes.

With reference to Fig. 7, an assembled 12-segment toothbrush 10 has two form keys 18, 19 to provide three different changeable brushing configurations. Figure 8 illustrates the separate components of the 12-segment bristle mount 14. The 12 segments 14c, each of which holds a row of bristles, move up and down independently with respect to each other. They are all held together in a hollow housing 22. The different brushing

configurations are created by the use of a form key 18 and, or 19. The form key normally lays flat beneath the row of segments. These keys are designed to engage and disengage the mount 14 depending on the rotational direction of the twist rod. When twisted 45 degrees into an upright position, the key moves each segment to a new location to form a different bristle surface 12 configuration. Figure 9 illustrates some of the alternative design variations of the segmented bristle mount 14.

Figure 10 shows eight assorted brush configurations 21d-21h all of which can be used on the 10 or 12-segment toothbrush with forming keys. The keys are extracted from their above assembly simply to see them better. It demonstrates some the different configuration achievable with the use of these keys 21. The key 21 and bottom portions of the segments 14c may be magnetized with magnet plates51 and 52 to assist in holding the segments 14c in place, a shown in Fig. 13. The key 21 may be made of metal and magnetized along with the bottoms of each segment 14c to complete a mechanism for retaining the segments 14c in position. The magnetic version of the invention 10 in Fig. 13 is a self-conforming toothbrush that self-conforms to any shape automatically. It is also possible to spring load each segment 14c.

Figure 11 shows a 10-segment brush with a formed wire twist guide 31. This changeable segmented brush is altered by the use of a preformed wire 31 used as a twist guide. When turned 180 degrees it transforms from a radial shaped brush to a straight plane then to an inverted radial shape. There are a number of selections that vary the intensity of the radius between the two extremes to provide a multi-selectable toothbrush. Figure 12 shows the same 10-segment brush without the housing.

The instant invention has been shown and described herein in what is considered to be the most practical and preferred embodiment. It is recognized, however, that departures may be made therefrom within the scope of the invention and that obvious structural and/or functional modifications will occur to a person skilled in the art.